REMARKS

Receipt of the office action mailed March 2, 2010 is acknowledged. Claims 1-3 are pending in the application and are rejected under U.S.C. §103(a) as obvious over Balsells '937 in view of Balsells '838. New claims 4-6 are submitted herewith for consideration. In keeping with the foregoing amendments and the following argument, Applicants respectfully request reconsideration and allowance.

Support for the amendments to claim 1 can be found at least in Paras. [0001], [0030], and [0032]. Support for new claims 4-6 can be found in the same paragraphs in addition to Para. [0005], as well as in original claims 1-3. Accordingly, no new matter has been added.

In accordance with an aspect of a seal constructed in accordance with the teachings of amended claim 1, the gas seal structure may achieve one or more benefits not achievable with the prior art. First, the invention of claim 1 is for use with a gas which has a high permeability with respect to a rubber material, such as the rubber material used to form the main seal means. Next, using the main seal means of the rubber material, it is possible to suppress gas from the high-pressure side from flowing toward the main seal means, which in turn suppresses pressure variations of the gas surrounding the main seal means. Further, using a resin sub-seal means it is possible to inhibit occurrence of the blistering phenomenon in the main seal means on the high-pressure side, which thereby inhibits reducing the sealing ability which would otherwise be caused by the blistering phenomenon. This makes it possible to suppress the gas from flowing toward the main seal means even when rapid pressure changes occurs on the high-pressure side, and makes it possible to maintain the suppression of the pressure variation of the gas achieved by using the resin sub-seal means disposed as recited by claim 1. Finally, by employing the pressure reducing means as recited by claim 1, a pressure variation transmitted from the sub-seal means to the main seal means can be reduced in the variation reducing space. Therefore, it is possible to inhibit rapid pressure changes in areas adjacent the main seal means. Thus, the invention of claim 1 can be used with a gas having high permeability with respect to the rubber member, without occurrence of the blister phenomenon in the main seal means, which enhances the sealing ability.

Turning to the rejection at hand, claim 1 relates to a gas seal structure for use with a gas having a high permeability with respect to a rubber material, and positively recites a main seal means that is made of the rubber material and is disposed between two seal surfaces, a sub-seal means that is made of resin and is disposed between the two seal surfaces, with the sub-seal means being located closer to a higher-pressure region than the main seal means and being provided with a concave groove, and a pressure variation reducing means that is disposed between the main seal means and the sub-seal means. The pressure variation reducing means has a variation reducing space connected to a gap formed between the two seal surfaces and has a volume that is able to inhibit occurrence of a blistering phenomenon in the main seal means. The variation reducing space is closed by the main seal means and the sub-seal means.

By comparison, Balsells `937 relates to a seal structure for lubricating oil rather than a seal structure for a gas having a high permeability with respect to a rubber member. One seeking the solution to the problem of the blistering phenomenon experienced by rubber seals in the face of highly permeable gases and pressure variations would not look to the vastly different field of seals for lubricating oils to seek the solution to the problem. In a device of the present application, the problem is how to suppress the occurrence of the blister phenomenon caused by a rapid pressure change of the gas, and inhibit leakage of the gas into atmosphere which would be caused by the reduced ability of the seal due to the blister phenomenon. On the other hand, the invention of Balsells `937 is directed to preventing uneven wear of a bearing, and thus the reference uses lubricating oil. However, the blister phenomenon will not occur in the seals 124 and 130 at all, because lubricating oil does not leak and diffuse into atmosphere at all, unlike the conditions experienced with the invention of the subject application. Consequently, Balseslls '937 is non-analogous art and cannot support a *prima facie* case of obviousness. Claim 1 is allowable for at least this reason.

Further, Balsells '937 discloses a cartridge type spring loaded shaft, in which two seals 124 and 130 are provided between two seal surfaces and a gap is formed between the two seals 124 and 130. However, Balsells '937 does not disclose or suggest that the seal on the high-pressure side (one of the two seals 124 and 130) is made of resin, nor does it disclose that a resin seal is disposed on the high pressure side. The limitations are entirely

missing from the reference, and thus there cannot be a proper *prima facie* case of obviousness for this reason as well.

Further, the gap between the seals 124 and 130 is connected to conduits 142 which are connected to atmosphere to be used when the lubricating oil is supplied to the gap or measuring leakage of a fluid into the gap. Note that the gap between the seals 124 and 130 is not closed, because the lubricating oil is supplied or leakage of the fluid is measured. In other words, Balsells `937 does not disclose that there is a gap closed between the seals 124 and 130. Again the relevant limitation is missing, and again there cannot be a proper *prima facie* case of obviousness for this additional reason.

Further, as outlined above, Balsells `937 is directed to preventing uneven wear on a bearing by using lubricating oil, and in the arrangement of the reference the blistering phenomena simply will not occur in the seals 124 and 130 because the oil does not leak and diffuse into atmosphere. In contrast, the invention of the subject application relates to the gas seal structure for use with highly permeable gases relative to a rubber seal member, and thus the structure of claim 1 suppresses the occurrence of the blister phenomenon caused by a rapid pressure changes of the gas, and thus inhibits leakage of the gas into atmosphere caused by blistering. The invention of claim 1 achieves such a result in the face of a highly permeable gas, in part by having a variation reducing space between the two seals and connected to the gap, and by positioning the particular main and sub-seal means as claimed. The result is an entirely different technical concept compared to Balsells `937, which lacks these features and capabilities.

Balsells `838 does not cure the deficiencies of the primary reference. Balsells '838 discloses that seals are made of plastic, but the reference does not disclose that a resin-made seal member is disposed on the high-pressure side at all. In addition, Balsells `838 does not disclose that the gas seal structure is used with highly permeable gas with respect to rubber, and does not disclose the gap disposed between and closed by the two seals. Therefore, Balsells '838 is irrelevant with respect to teachings related to a highly permeable gas, is irrelevant with respect to having a rubber main seal and a resin sub-seal as claimed, and is irrelevant with respect to the claimed variation reducing space.

For one or more of the foregoing reasons, the cited combination does not support a proper *prima facie* case of obviousness, and therefore claim 1 is in allowable form. Claims 2 and 3 depend from claim 1, and therefore claims 2 and 3 are also allowable.

New claim 4 submitted herewith positively recites a main seal comprising a rubber material, the main seal disposed between two seal surfaces, the rubber material having a high permeability when exposed to a gas having a low molecular weight, a sub-seal comprising a resin material, the sub-seal disposed between the two seal surfaces, the sub-seal disposed closer to a higher-pressure region than the main seal, a concave groove formed in the sub-seal, a gap formed between the two seal surfaces adjacent the sub-seal, and an enclosed pressure variation reducing space. The enclosed pressure variation reducing space is disposed between the main seal and the sub-seal and is in flow communication with the gap, and the pressure variation reducing space is closed by the main seal and the sub-seal, with the pressure reducing space having a volume arranged to inhibit occurrence of a blistering phenomenon in the main seal.

The invention of claim 4 is not taught or properly suggested by the cited combination, at least for the same reasons as outlined above with respect to claim 1. Accordingly, claim 4 is in allowable form, as are new dependent claims 5 and 6.

In view of the foregoing, the above-identified application is in condition for allowance. In the event there is any remaining issues that the Examiner believes can be resolved by telephone, the Examiner is respectfully invited to contact the undersigned attorney at (312) 474-6300.

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Respectfully submitted,

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